

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

Claim 1 (Currently Amended): An elongate waveguide for guiding light, comprising:

a core region, comprising an elongate region of relatively low refractive index;
and

a cladding region, comprising elongate regions of relatively low refractive index interspersed with elongate regions of relatively high refractive index, including, in a transverse cross-section of the waveguide, a relatively high refractive index boundary region that surrounds the core region, wherein the boundary region comprises a plurality of relatively high refractive index boundary veins joined end-to-end around the core region at boundary nodes, each boundary node being joined between two boundary veins and to at least one relatively high refractive index region of the cladding region, wherein the boundary region has at most two-fold rotational symmetry at least in part due to one or more boundary veins having different properties than other boundary veins or at least in part due to one or more boundary nodes having different properties than other boundary nodes and has either (1) at most two-fold rotational symmetry or (2) a rotational symmetry that reduces the rotational symmetry of the waveguide to at most two-fold rotational symmetry, the symmetry of the boundary region resulting at least in part from azimuthal variations therein, which are substantially uncharacteristic of the cladding region.

Claim 2 (Original): A waveguide according to claim 1, wherein the boundary region has at most two-fold rotational symmetry at least in part due to azimuthal variations in a property of the boundary region.

Claim 3 (Previously Presented): A waveguide according to claim 1, wherein the boundary region has at most two-fold rotational symmetry at least in part due to azimuthal variations in its thickness, shape, refractive index or other material properties.

Claim 4 (Canceled)

Claim 5 (Currently Amended): A waveguide according to claim 1, ~~[[4,]]~~ wherein the boundary region has at most two-fold rotational symmetry at least in part due to one or more boundary veins having different properties than other boundary veins.

Claim 6 (Currently Amended): A waveguide according to claim 1, ~~[[4,]]~~ wherein the boundary region has at most two-fold rotational symmetry at least in part due to one or more boundary veins having a different thickness, shape, length, refractive index or other material property than other boundary veins.

Claim 7 (Currently Amended): A waveguide according to claim 1, ~~[[4,]]~~ wherein the boundary region has at most two-fold rotational symmetry at least in part due to one or more boundary nodes having different properties than other boundary nodes.

Claim 8 (Currently Amended): A waveguide according to claim 1, ~~[[4,]]~~ wherein the boundary region has at most two-fold rotational symmetry at least in part due to one or more boundary nodes having a different size, shape, refractive index or other material property than other boundary nodes.

Claim 9 (Previously Presented): A waveguide according to claim 1, wherein the boundary region comprises an inner periphery and an outer periphery, which has a substantially different form than the inner periphery.

Claim 10 (Original): A waveguide according to claim 9, wherein the combination of the forms of the inner periphery and the outer periphery result in the boundary region having at most two-fold rotational symmetry.

Claim 11 (Previously Presented): A waveguide according to claim 1, wherein the boundary region comprises a plurality of boundary cells around the core region.

Claim 12 (Original): A waveguide according to claim 11, wherein the boundary region has at most two-fold rotational symmetry at least in part due to differences in one or more of the characteristics of the boundary cells.

Claim 13 (Previously Presented): A waveguide according to claim 11, wherein the boundary cells together do not tile onto any arrangement of cells in the cladding region.

Claim 14 (Previously Presented): A waveguide according to claim 1, wherein, the cladding region comprises an array of relatively low refractive index regions in a matrix of relatively high refractive index regions.

Claim 15 (Original): A waveguide according to claim 14, wherein, the array, apart from the boundary region, is substantially periodic.

Claim 16 (Previously Presented): A waveguide according to claim 1, wherein, the cladding region, apart from the boundary region, has a highest rotational symmetry that is less than or equal to two.

Claim 17 (Previously Presented): A waveguide according to claim 1, wherein, the cladding region, apart from the boundary region, has a rotational symmetry that is greater than two.

Claim 18 (Previously Presented): A waveguide according to claim 1, wherein, the core region, apart from the boundary region, has a highest rotational symmetry that is less than or equal to two.

Claim 19 (Previously Presented): A waveguide according to claim 1, wherein, the core region, apart from the boundary region, has a rotational symmetry that is greater than two.

Claim 20 (Previously Presented): A waveguide according to claim 1, wherein the core region includes a hole.

Claim 21 (Original): A waveguide according to claim 20, wherein the hole is filled with a material other than air.

Claim 22 (Previously Presented): A waveguide according to claim 1, wherein the core region does not include a hole.

Claim 23 (Previously Presented): A waveguide according to claim 1, wherein at least some of the relatively high refractive index regions comprise fused glass.

Claim 24 (Previously Presented): A waveguide according to claim 1, wherein at least some of the relatively low refractive index regions comprise a hole.

Claim 25 (Previously Presented): A waveguide according to claim 1, having a beat length, which is less than 10mm at a given wavelength.

Claim 26 (Original): A waveguide according to claim 25, in which the given wavelength is in the region of 1550nm, 1310nm, 1060nm or 800nm.

Claim 27 (Previously Presented): A waveguide according to claim 1, wherein, in use, the two polarization states of a spatial mode of the waveguide exhibit significantly different field decays at a given radial distance from the centre of the waveguide.

Claim 28 (Previously Presented): A waveguide according to claim 1, wherein the amount by volume of relatively lower refractive index material in the cladding region exceeds 50%.

Claim 29 (Previously Presented): An optical fibre comprising a waveguide according to claim 1.

Claim 30 (Original): An optical transmission system incorporating an optical fibre according to claim 29.

Claim 31 (Currently Amended): A method of forming the optical fibre according to claim 29, wherein the optical fibre is a photonic crystal fibre, comprising including the steps:

forming a preform comprising an elongate, relatively low refractive index core region, and, surrounding the core region, an elongate cladding region, comprising elongate regions of relatively low refractive index interspersed with elongate regions of relatively high refractive index;

forming, at the interface between the core region and the cladding region, a boundary region, comprising one or more relatively high refractive index regions, which has at most two-fold rotational symmetry due to azimuthal variations, which are uncharacteristic of the cladding region; and

drawing the pre-form into a fibre, which has no more than two-fold rotational symmetry about any longitudinal axis.

Claim 32 (Original): A method according to claim 31, including forming the pre-form from a plurality of elongate members, at least some of which are capillaries.

Claim 33 (Original): A method according to claim 31, including forming the pre-form by extrusion.

Claim 34 (Currently Amended): A method of forming the optical fibre according to claim 29, wherein the optical fibre is a birefringent photonic crystal fibre, comprising the steps:

arranging a plurality of elongate members, at least some of which are capillaries, into a pre-form stack comprising an elongate cladding region enclosing an elongate core region, the members in the cladding region forming a characteristic pattern, apart from at least one member in a boundary region, at or near to the core region, which breaks the characteristic pattern and renders the boundary region, in the transverse cross-section, no more than two-fold rotationally symmetric about any axis; and
drawing the pre-form stack into a fibre, which has no more than two-fold rotational symmetry about any longitudinal axis.

Claim 35 (Previously Presented): A waveguide according to claim 1, wherein the boundary region defines the cross-sectional shape of the core region.

Claim 36 (Previously Presented): A waveguide according to claim 1, wherein the boundary region is arranged at the interface between the core region and the cladding region.

Claim 37 (Previously Presented): A waveguide according to claim 34, wherein the boundary region is arranged at the interface between the core region and the cladding region.

Claim 38 (Previously Presented): The waveguide according to claim 1, wherein the elongate region of relatively low refractive index comprises an air hole.

Claim 39 (Canceled)